

## Spatial Distribution, Characteristics, and Pollution Risk Assessment of Microplastics in Sediments from Karnaphuli River Estuary, Bangladesh

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**Abstract :** Microplastics (MPs) have become an emerging global pollutant due to their wide spread and dispersion and potential threats to marine ecosystems. However, studies on MPs of estuarine and coastal ecosystems of Bangladesh are very limited or not available. In this study, we conducted the first study on the abundance, distribution, characteristics and potential risk assessment of microplastics in the sediment of Karnaphuli River estuary, Bangladesh. Microplastic particles were extracted from sediments of 30 stations along the estuary by density separation, and then enumerated and characterize by using stereomicroscope and Fourier Transform Infrared (FT-IR) spectroscopy. In the collected sediment, the number of MPs varied from 22.29 - 59.5 items kg<sup>-1</sup> of dry weight (DW) with an average of 1177 particles kg<sup>-1</sup> DW. The mean abundance was higher in the downstream and left bank of estuary where the predominant shape, colour, and size of MPs were films (35%), white (19%), and >5000 μm (19%), respectively. The main polymer types were polyethylene terephthalate, polystyrene, polyethylene, cellulose, and nylon. MPs were found to pose risks (low to high) in the sediment of the estuary, with the highest risk occurring at one station near a sewage outlet, according to the results of risk analyses using the pollution risk index (PRI), polymer risk index (H), contamination factors (CFs), and pollution load index (PLI). The single value index, PLI clearly demonstrated that all sampling sites were considerably polluted (as PLI >1) with microplastics. H values showed toxic polymers even in lower proportions possess higher polymeric hazard scores and vice versa. This investigation uncovered new insights on the status of MPs in the sediments of Karnaphuli River estuary, laying the groundwork for future research and control of microplastic pollution and management.

**Keywords :** microplastics, polymers, pollution risk assessment, Karnaphuli estuary

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